NICOLET SCIENTIFIC CORPORATION

Serial Number _____

Instruction Manual

for

VLI

THE
MODEL 30 SERIES
OF
RANGE TRANSLATION UNITS

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SECTION I

INTRODUCTION

1-1. PURPOSE OF THE EQUIPMENT.

1-2. The Model 30 Series of Range Translation Units are designed primarily for use with Nicolet Scientific Corporation's Ubiquitous® Spectrum Analyzers, to obtain high-resolution analysis of signals lying outside the frequency coverage of the basic analyzer. When thus used, the Range Translation Unit performs translation of a selected frequency band, from one frequency region to another, extending the frequency coverage of the Spectrum Analyzer. A typical unit, with rack mounting brackets attached to each side of the front panel, is shown in Figure 1-1.

1-3. A Range Translation Unit may also be used separate from a Ubiquitous® Spectrum Analyzer as a tunable, center-frequency, bandpass filter of selectable filter bandwidth.

NOTE

Throughout the remainder of this instruction manual, the word "Translator" is used as the abbreviated term for the Range Translation Unit.

1-4. BASIC FEATURES OF OPERATION.

1-5. The frequency band which is to be translated to another frequency region is determined by the translation signal. Any one of a number of sources of translation signals may be used in a particular model of the Translator. These sources may be:

a. A customer-supplied external frequency synthesizer (or precision digital oscillator). This signal source is required for use with either the Model 30A or the Model 30A/L Translator.

b. An external frequency synthesizer (or precision digital oscillator) which is supplied by Nicolet Scientific Corp. This signal source is supplied when either a Model 30A/S or a Model 30A/LSS Translator is ordered.

c. When an internal frequency synthesizer is supplied, the unit is designated the Model 30A/L/IS or 30B.

1-6. OMITTED.

1-7. VARIOUS MODELS OF RANGE TRANSLATORS COVERED IN THIS MANUAL.

1-8. This instruction manual covers various models of Translators. Table 1-1 covers those Translators which provide a translation range up to 1.95 MHz. Table 1-2 lists the Translators which permit a translation range up to 99 kHz. The extreme left column of each table lists the model number. An "X" in the appropriate Frequency Range column of each table indicates that the designated range is provided in a particular model.

Note

For each of the indicated ANALYSIS RANGES listed in Tables 1-1 and 1-2, the lower limit of frequency translation is always one-half of the selected range. For example: in the 20 kHz range on the Model 30A Translator (Table 1-1), the lower limit of translation is 10 kHz; the total translation band then extends from 10 kHz to 1.95 MHz. As a second example, activating the 2000 Hz range on the Model 30A/L series of Translators (Table 1-2), yields a total translation band from 1000 Hz to 99 kHz.

TABLE 1-1. ANALYSIS RANGES PROVIDED ON MODEL 30A TRANSLATORS, FOR FREQUENCY TRANSLATION TO 1.95 MHz

Model No.	Analysis Range				
	20 kHz	10 kHz	2 kHz	1 kHz	500 Hz
30A	X	X	X	X	
30A-5	X	X	X	X	X

Note: The Model 30A/S Translator is identical to the Model 30A, except that a Frequency Synthesizer is supplied with the Translator.

TABLE 1-2. ANALYSIS RANGES PROVIDED ON MODEL 30A/L TRANSLATORS, FOR FREQUENCY TRANSLATION TO 99 kHz ("L" denotes lower frequency ranges)

Model No.	Analysis Range					
	2000 Hz	1000 Hz	500 Hz	100 Hz	50 Hz	10 Hz
30A/L	X	X	X	X	X	X
30A/L-3	X	X	X	X		
30A/L-4			X	X	X	X
30A/L-5	X	X	X	X	X	
30B	X	X	X	X	X	

Note: The Models with "SS" suffix are supplied with an External Frequency Synthesizer, and with "/IS" or 30B are supplied with an internal synthesizer.

1-9. RELATIONSHIP OF BANDPASS ANALYSIS RANGES TO TRANSLATED FREQUENCY RANGES.

1-10. In addition to the standard models (listed in Tables 1-1 and 1-2), the customer may order a Translator with special translation ranges. A total of seven ranges may be included in the Translator. Table 1-3 presents the relationship of the available bandpass ranges, the corresponding translation range, and the required translation frequency for that range. The purpose of each of the eleven columns provided in Table 1-3 is described below:

a. The extreme left column of the table divides the listing into two groups of ranges. Group 1 applies to translation ranges covering specified lower limits to an upper limit of 1.95 MHz. Group 2 is applicable to those translation ranges with specified lower limits, but extending to an upper limit of 99 kHz.

b. The second column of the table lists the bandpass ranges which are provided in the various models of Ubiquitous® Spectrum Analyzers.

c. The third column of the table shows lower and upper limits of the frequency range to which a specific bandpass range can be translated.

d. Columns 4 through 10 list the bandwidth (Beta) of the synthesized filter which is associated with each of the bandpass ranges.

e. The extreme right column is provided for the convenience of the customer. A check mark in this column is an indication that these bandpass ranges are applicable to the particular serial-numbered Translator which is covered by this instruction manual.

TABLE 1-3. ANALYSIS RANGES, TRANSLATION RANGES, AND ASSOCIATED DATA FOR THE MODEL 30 SERIES OF TRANSLATORS

	Analysis Range on the Spectrum Analyzer	Translation Range	Bandwidth (β) of the Synthesized Filter in Hz, When Used With the Following Spectrum Analyzer Model									Check Mark Indicates Included Ranges
			UA-10A	UA-14A & 440†	UA-15A	UA-6B	UA-8B	UA-9A	UA-9A/2000	UA-500	FFT-400	
	100 kHz*	50 kHz to 4.90 MHz	N/A	N/A	N/A	N/A	200	N/A	N/A	200	125	
GROUP 1	50 kHz	25 kHz to 1.95 MHz	250	125	100	N/A	100	N/A	N/A	100	63	
	40 kHz	20 kHz to 1.95 MHz	N/A	N/A	N/A	80	N/A	40	N/A	N/A	N/A	
	20 kHz	10 kHz to 1.95 MHz	100	50	40	40	40	20	20	40	25	
	10 kHz	5 kHz to 1.95 MHz	50	25	20	20	20	10	5	20	12.5	
	5 kHz	2.5 kHz to 1.95 MHz	25	12.5	10	10	10	5	2.5	10	6.3	
	2 kHz	1 kHz to 1.95 MHz	10	5	4	4	4	2	1	4	2.5	
	1 kHz	500 Hz to 1.95 MHz	5	2.5	2	2	2	1	0.5	2	1.25	
	0.5 kHz	250 Hz to 1.95 MHz	2.5	1.25	1	1	1	0.5	0.25	1	0.63	
GROUP 2	2,000 Hz	1,000 Hz to 99 kHz	10	5	4	4	4	2	1	4	2.5	✓
	1,000 Hz	500 Hz to 99 kHz	5	2.5	2	2	2	1	0.5	2	1.25	✓
	500 Hz	250 Hz to 99 kHz	2.5	1.25	1	1	1	0.5	0.25	1	0.63	✓
	200 Hz	100 Hz to 99 kHz	1	0.5	0.4	N/A	N/A	N/A	N/A	0.4	0.25	✓
	100 Hz	50 Hz to 99 kHz	0.5	0.25	0.2	0.2	0.2	0.1	.05	0.2	0.125	✓
	50 Hz	25 Hz to 99 kHz	.25	.125	0.1	0.1	0.1	.05	.025	0.1	0.063	✓
	20 Hz	10 Hz to 99 kHz	0.1	.05	0.04	N/A	N/A	N/A	N/A	0.04	0.025	
	10 Hz	5 Hz to 99 kHz	.05	.025	0.02	.02	N/A	.01	.005	0.02	0.013	

*Note. Center frequency of the 100 kHz Analysis Range is 5 MHz.

†Note. The frequency ranges of the Model 440 Analyzer Series is identical to the Model UA-14A with the exception of the 50 kHz Analysis Range which is not applicable to the Model 440.

1-11. ELECTRICAL AND PHYSICAL CHARACTERISTICS.

1-12. The detailed electrical and physical characteristics of the Model 30 Series of Translators are presented in Table 1-4, which follows.

TABLE 1-4. SPECIFICATIONS

a. OPERATIONAL MODES:

(1) TRANSLATE Mode.....In this mode, the Translator is activated. The origin of the translated signal is at a frequency equal to 10% of the selected analysis range width. Simultaneously, the Analyzer is directed to analyze signals from 10% to 110% of the selected analysis range width. This results in a normal spectrum display, despite the 10% offset of the input spectrum.

(2) BYPASS Mode.....In BYPASS mode of operation, the input signal to the Translator is fed directly to the output jack (bypassing the Translator's circuits). Operation of the spectrum analyzer is normal.

(3) REMOTE Mode.....In REMOTE mode of operation, the selection of either the TRANSLATE or the BYPASS mode is made remotely (by application of a logic level to the appropriate pin on the multipin connector which is mounted on the rear panel).

b. ANALYSIS RANGE SELECTION MODES:

(1) MANUAL Selection.....Depressing any one of the inscribed front-panel pushbuttons permits the operator to have manual selection of the filter bandwidth which is used for a particular measurement. This mode must be used when operating in conjunction with a Model 440 Spectrum Analyzer.

(2) REMOTE Selection.....Depressing the ANALYZER CONTROL pushbutton slaves the Translator's band-

width to the analysis range of the spectrum analyzer. In "stand-alone" operation, this mode may be used for remote control of the Translator's bandwidth. This mode is not operable when using the translator with a Model 440 Spectrum Analyzer.

c. TRANSLATION FREQUENCY:

(1) NORMAL ..... The translation signal to be used is above the "edge" frequency, (f_o), of the internal filters (2 MHz or 100 kHz). The exact input frequency is equal to (f_o) plus the desired origin frequency (f_1).

(2) FREQUENCY SYNTHESIZER "/S", (EQUIPMENT SUPPLIED) (Optional Feature) ..... When this option is supplied, a high-stability Frequency Synthesizer is provided as a source of translation frequency for the Model 30A Translator. (See Table 1-5 for characteristics of the Synthesizer.)

(3) FREQUENCY SYNTHESIZER "/SS", (EQUIPMENT SUPPLIED) (Optional Feature) ..... This option also provides a high-stability Frequency Synthesizer as a source of translation frequency, but this option is used with the Model 30A/L Translator. (See Table 1-5 for characteristics of the Synthesizer.)

(4) INTERNAL SYNTHESIZER "/IS" or "B" (Optional Feature) ..... This option provides a built-in high-stability Frequency Synthesizer as a source of translation frequency for use with the Model 30A/L series only. Origin frequency may be set by a 5-digit front-panel control, up to 100 kHz in 10-Hz steps.

TABLE 1-4. SPECIFICATIONS (CONT)

d.	DOWN CONVERTER CHARACTERISTICS, USING THE INTERNAL CONVERSION OSCILLATORS	Internal oscillators are supplied for down conversion of the filtered signal to base band. A separate oscillator is supplied for each filter bandwidth. Short-term stability is ±1 ppm (parts per million) per 24 hours, when the unit is operated in an ambient temperature between 15 and 35 degrees C. Long term stability is ±.1 ppm per week maximum at 20° C. Screwdriver adjustment range is approximately ±20 ppm. An internal frequency synthesizer may be employed in place of the above fixed frequency oscillators on certain units.
e.	DOWN CONVERSION FROM AN EXTERNAL FREQUENCY SOURCE	Provision is made for application of an external down-conversion frequency, to allow translation to other than base band frequencies.

TABLE 1-4. SPECIFICATIONS (CONT)

f. SIGNAL INPUT CHARACTERISTICS

(1) INPUT SIGNAL LEVEL (for full-scale output with 0 dB attenuator setting) .....0.1V rms for filter bandwidths listed in Group 1 of Table 1-3; 0.01V rms for filter bandwidths listed in Group 2 of Table 1-3.

(2) INPUT COUPLING...In TRANSLATE mode: a-c coupling (3 dB low-frequency cutoff at 5 Hz); in BYPASS mode: direct coupling.

(3) INPUT IMPEDANCE..10 kilohms, 30 pf.

(4) ATTENUATOR.....Input attenuator (operates in TRANSLATE mode only) at maximum of 50 dB, in 5-dB steps; accuracy: ±0.5 dB, up to 100 kHz. (Optional Wide Bandwidth Attenuator "/R" available to 2 MHz.)

(5) OVERLOAD INDICATION.....OVERLOAD lamp (provided on the front panel) illuminates at 0.3V rms for single pure-tone signal and at 0.2V rms for two-tone input.

(6) INTERMODULATION AND HARMONIC DISTORTION.....-50 dB.

g. REQUIREMENTS FOR EXTERNAL TRANSLATION FREQUENCY INPUT (Required for all models except for those models supplied with Option "/S", "/SS", "/IS", or "30B")

(1) SIGNAL LEVEL.....1 ±0.25V rms, into 600-ohm impedance.

(2) FREQUENCY RANGE..(a) 2 MHz, plus the desired origin frequency, for those filters listed in Group 1 of Table 1-3.

TABLE 1-4. SPECIFICATIONS (CONT)

(2) FREQUENCY RANGE .... (CONT)	(b) 100 kHz, plus the origin frequency (f_1) for those filters listed in Group 2 of Table 1-3.
(3) HARMONIC CONTENT ...	Less than -25 dB.
(4) NON-HARMONIC CONTENT	Less than the dynamic range of the Spectrum Analyzer, for those frequency settings required within the ranges of paragraph (2), above.
(5) DESIRED LONG-TERM STABILITY	The -20 dB width of the translation frequency should be less than 2 β. The -40 dB width of the translation frequency should be less than 4 β.

h. REQUIREMENTS FOR EXTERNAL DOWN-CONVERSION SIGNAL INPUT (This input may be used to provide frequencies which differ from those of the built-in crystal oscillator):

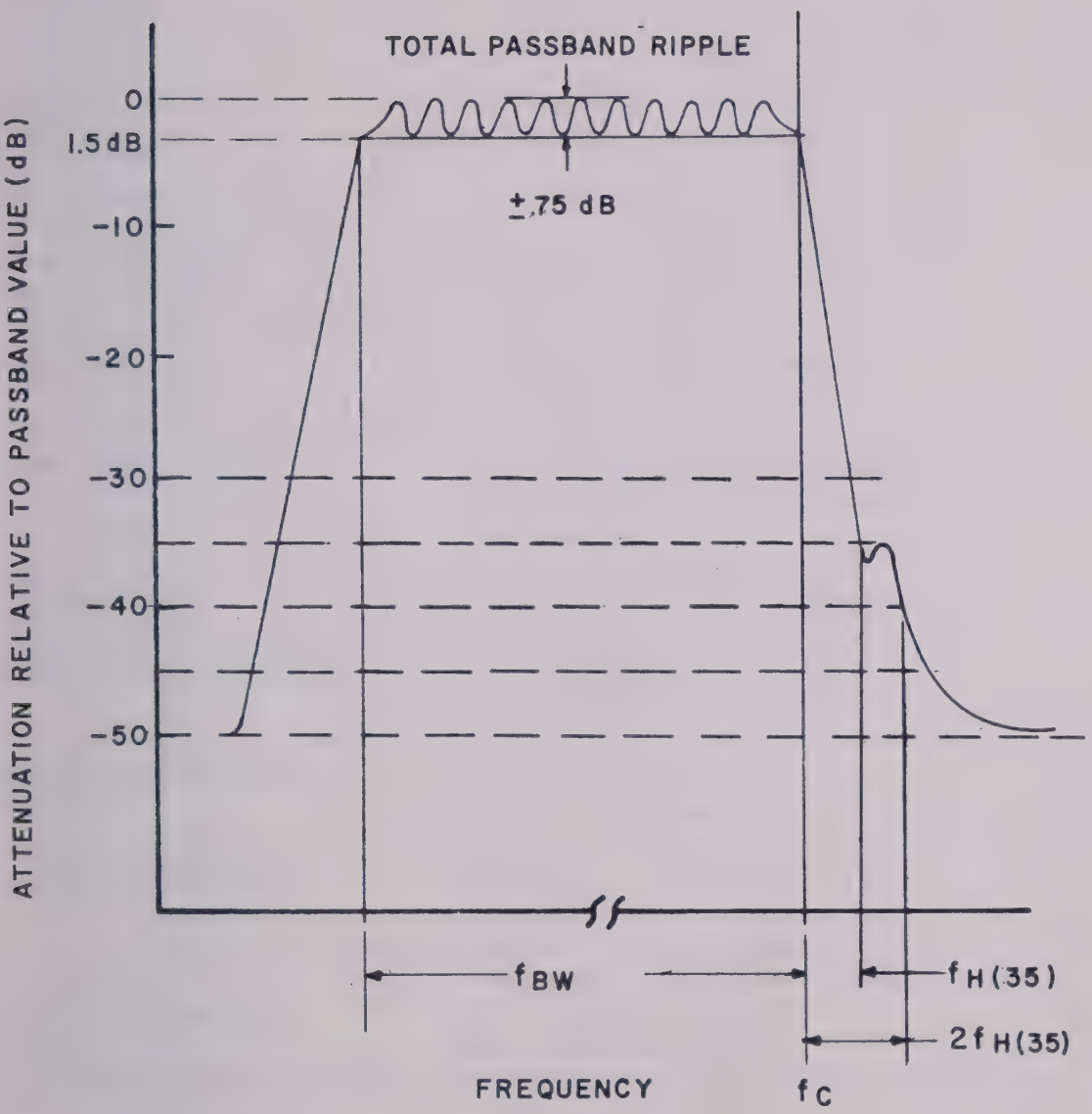
(1) SIGNAL LEVEL	1 ±0.25V rms, into nominal 1-kilohm impedance.
(2) FREQUENCY RANGE	100 kHz to 10 MHz.
(3) HARMONIC CONTENT ...	Less than -25 dB.
(4) NON-HARMONIC CONTENT	Less than the dynamic range of the Spectrum Analyzer.
(5) DESIRED LONG-TERM STABILITY	Better than the synthesized filter bandwidth, β, of the spectrum analyzer.
(6) SPECTRAL PURITY	The -20 dB width of the translation frequency should be less than 2 β. The -40 dB width of the translation frequency should be less than 4 β.

i. OUTPUT CHARACTERISTICS

(1) OUTPUT SIGNAL LEVEL. 1V rms

TABLE 1-4. SPECIFICATIONS (CONT)

(2)	SOURCE IMPEDANCE ...	1000 ohms.
(3)	AMPLITUDE FLATNESS VS FREQUENCY	±0.75 dB (with standard filters); for the 10 Hz Range: ±0.25 dB to 8.5 Hz.
(4)	GAIN STABILITY VS TEMPERATURE	Typically better than ±0.5 dB over the temperature range from 15 degrees C to 35 degrees C.
(5)	DYNAMIC RANGE	Typically, better than 60 dB.
(6)	FILTER SELECTIVITY	See Figures 1-2 and 1-3 for standard and Option "/Q" bandpass filters.
j.	OPERATING TEMPERATURE RANGE	+15 to +35 degrees C (+59 to +95 degrees F).
k.	STORAGE TEMPERATURE RANGE	-55 to +48 degrees C (-67 to +118 degrees F).
l.	A-C POWER REQUIREMENTS	115V ±10%; 50 Hz to 400 Hz, single phase; (units for operation from 220-volt a-c power source available).
m.	CABLES SUPPLIED	Two coaxial cables, each 4 ft long with BNC terminations at each end; one multi-conductor cable, 4 ft long, for interconnecting to the associated Ubiquitous® Spectrum Analyzer; and one a-c power cable.



LEGEND:

f_{BW} = ANALYSIS RANGE

$f_{H(35)} = 0.2\, f_{BW}$

Figure 1-2. Typical Selectivity Characteristics of Standard Bandpass Filters

TABLE 1-5. SPECIFICATIONS FOR THE OPTION "/S" AND "/SS" FREQUENCY SYNTHESIZERS

Characteristic	Capability or Limitation
*Origin frequency range	0 to 100 kHz, in 1 Hz steps
Frequency accuracy	$\pm$1 part in 10^6
Temperature stability: short term	$\pm$2 parts in 10^8/°C, over the range from 0° C to 50° C
Aging rate	1 part in 10^8 per day; 1 part in 10^6 per year
Phase noise	50 dB below the fundamental, with 0.02 Hz bandwidth around the fundamental
Programming	Binary or BCD (TTL logic)
Operating temperature	0 to +50 deg C (+32 to +122 deg F)
Storage temperature range	-20 to +70 deg C (-4 to +158 deg F)
Physical dimensions	3-1/2 in. (8,8 cm) H 17-3/8 in. (44,7 cm) W 15-1/4 in. (38,7 cm) D
Power requirements	115 or 220V AC $\pm$10% 50 to 60 Hz; 100 W

*Note. The "/S" Option can provide origin frequencies to 500 kHz, with roll-off in amplitude of approximately 3 dB and spurious level of approximately 35 dB.

TABLE 1-6. SPECIFICATIONS FOR THE OPTION "/IS" INTERNAL FREQUENCY SYNTHESIZER

Characteristic	Capability or Limitation
Origin frequency range	0 to 100 kHz, in 10-Hz steps
Frequency accuracy	$\pm$ 1 part in 10^6
Temperature stability: short term	$\pm$ 5 parts in $10^8/^oC$, over the range from 20° C to 50° C
Aging rate	1 part in 10^7 per week
Phase noise	50 dB below the fundamental, with 0.02-Hz bandwidth around the fundamental
Programming	Front panel controls
Operating temperature	0 to +50 deg C (+32 to +122 deg F)
Storage temperature range	-20 to +70 deg C (-4 to +158 deg F)

SECTION III

INITIAL CHECKOUT AND OPERATING PROCEDURES

3-1. SCOPE OF THIS SECTION.

3-2. This section of the instruction manual presents procedures required to perform an initial checkout, as a means of verifying that the Translator is ready for use. Also included in this section are diagrams which illustrate the interconnections required between the Translator and a particular model of the Ubiquitous® Spectrum Analyzer, and operating procedures.

3-3. INITIAL CHECKOUT PROCEDURES.

3-4. To check for proper operation of the Translator, proceed as directed below:

a. When the Translator is used with a Model UA-6, UA-8, or UA-9 Series of Ubiquitous® Spectrum Analyzer, interconnect the two instruments as shown in Figure 3-1.

b. When the Translator is used with a Mini-Ubiq® Model UA-10 or UA-10A Series of Spectrum Analyzer, interconnect the two equipments as shown in Figure 3-2.

c. When the Translator is used with a Model 440 Mini-Ubiquitous® Spectrum Analyzer, interconnect the two instruments as shown in Figure 3-3. Make sure to insert the paddle board assembly into connector J102 on the rear panel of the Spectrum Analyzer. Place the toggle switch on the paddle board assembly into the ON position. This will enable the 10% Frequency Axis shift required by the range translation process.

d. When using the Translator with a Model 440, the ANALYZER CONTROL pushbutton on the translator is not operative. Selection of a FREQUENCY RANGE on the Model 440 Spectrum Analyzer must be matched with the same TRANSLATED FREQUENCY RANGE pushbutton on the Model 30 Translator.

When using the translator with any other Spectrum Analyzer, depress the ANALYZER CONTROL pushbutton (if provided) or release all pushbuttons in the TRANSLATED FREQUENCY RANGE switch group. This action will slave the Translator's bandwidth to the selected analysis range on the Spectrum Analyzer.

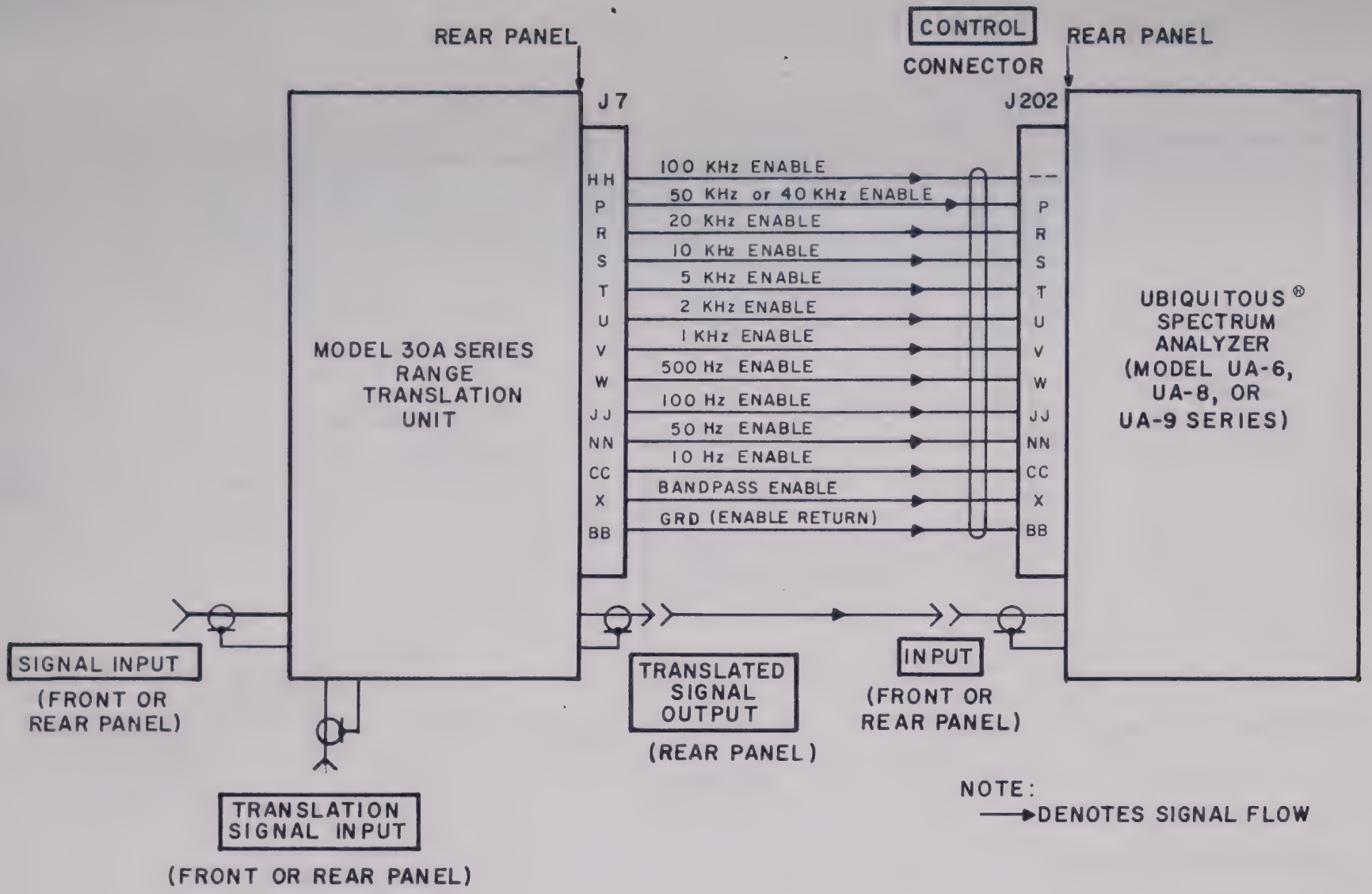


Figure 3-1. Interconnecting Diagram for the Model 30A Series of Translators with the Models UA-6, UA-8, or UA-9 Series of Analyzers

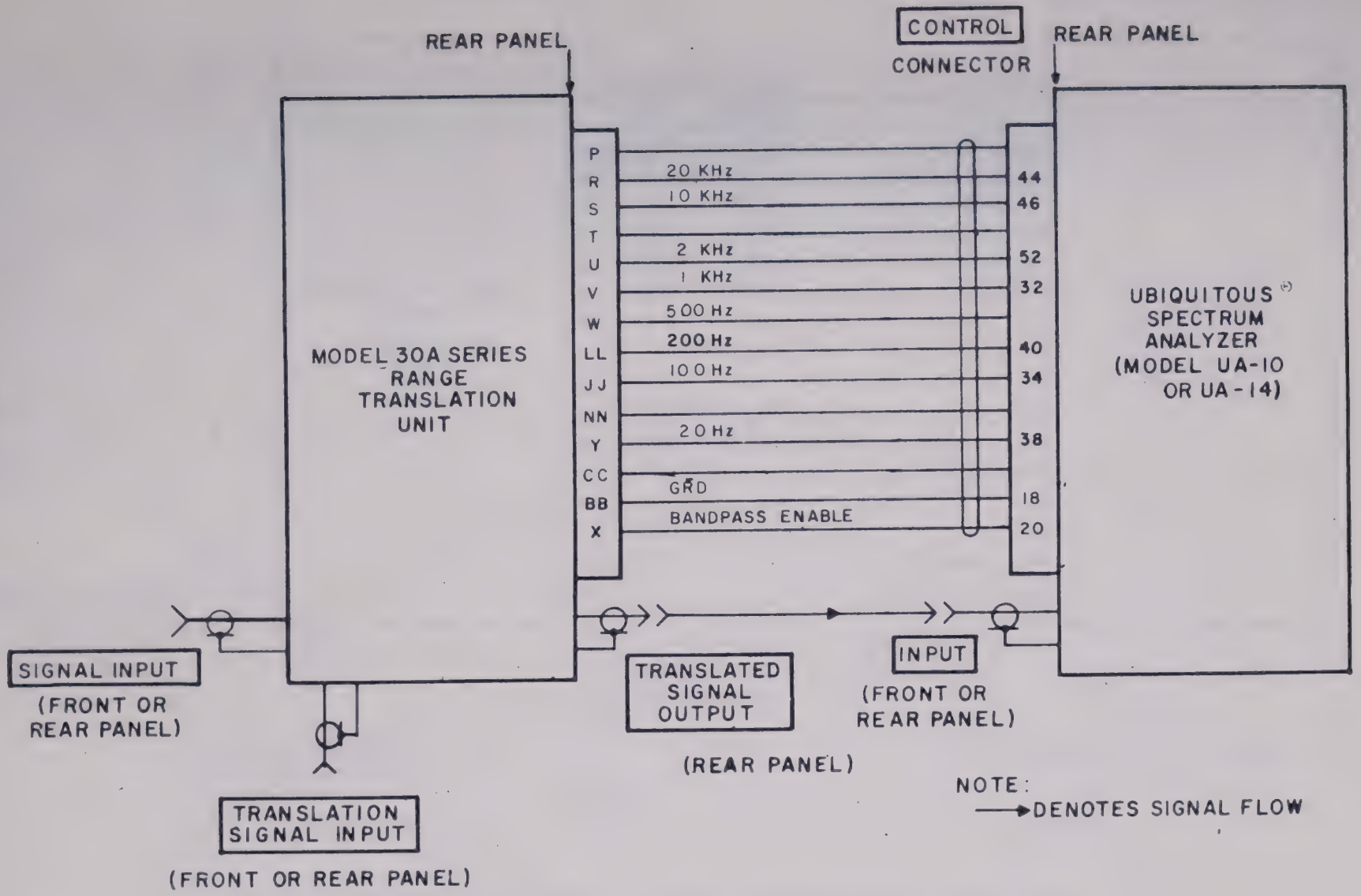


Figure 3-1A. Interconnecting Diagram for the Model 30A Series of Translators with Model UA-10 Series of Mini-Ubiq Analyzers

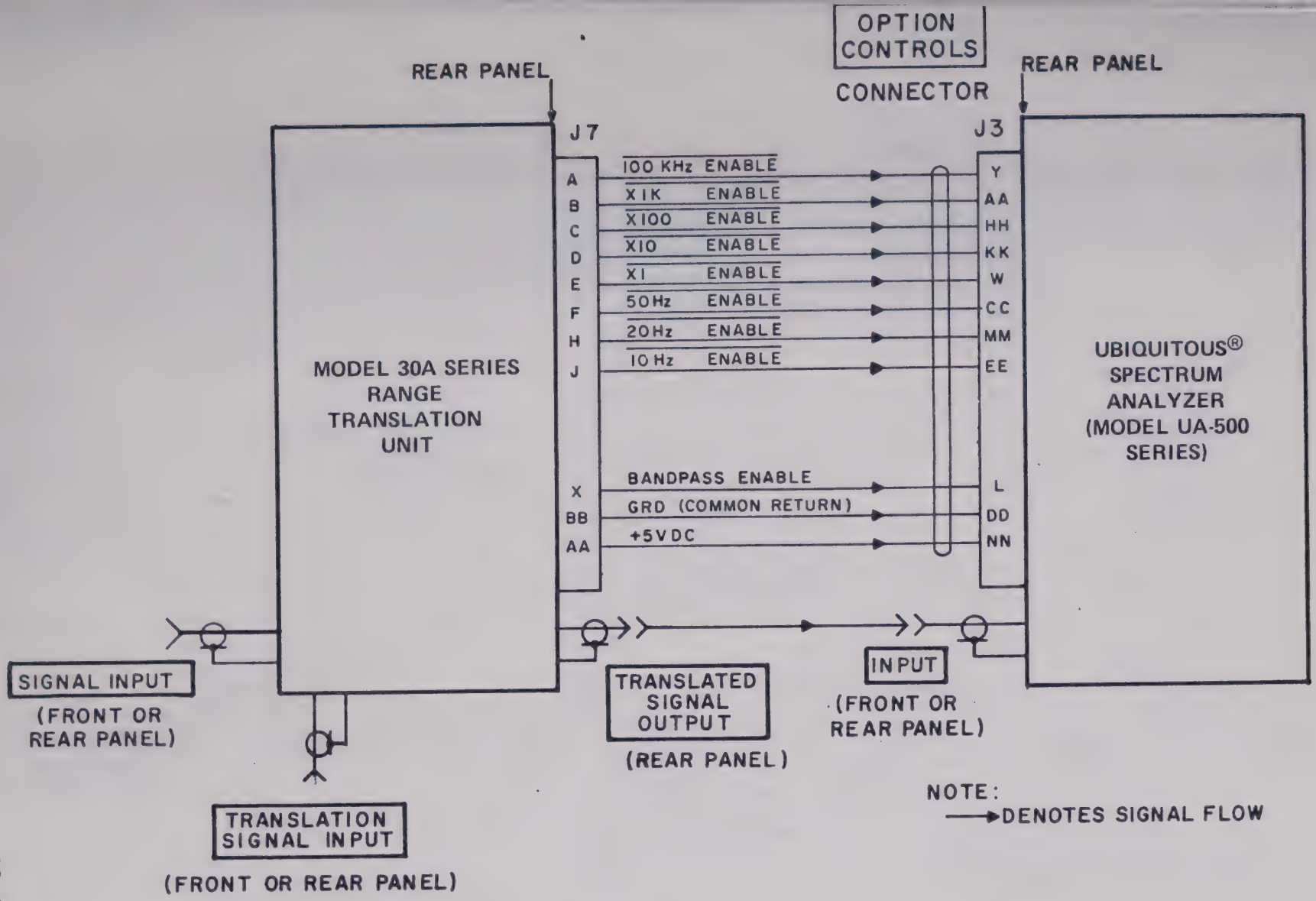


Figure 3-1B. Interconnecting Diagram for the Model 30A Series of Translators with the Model UA-500 Series of Analyzers

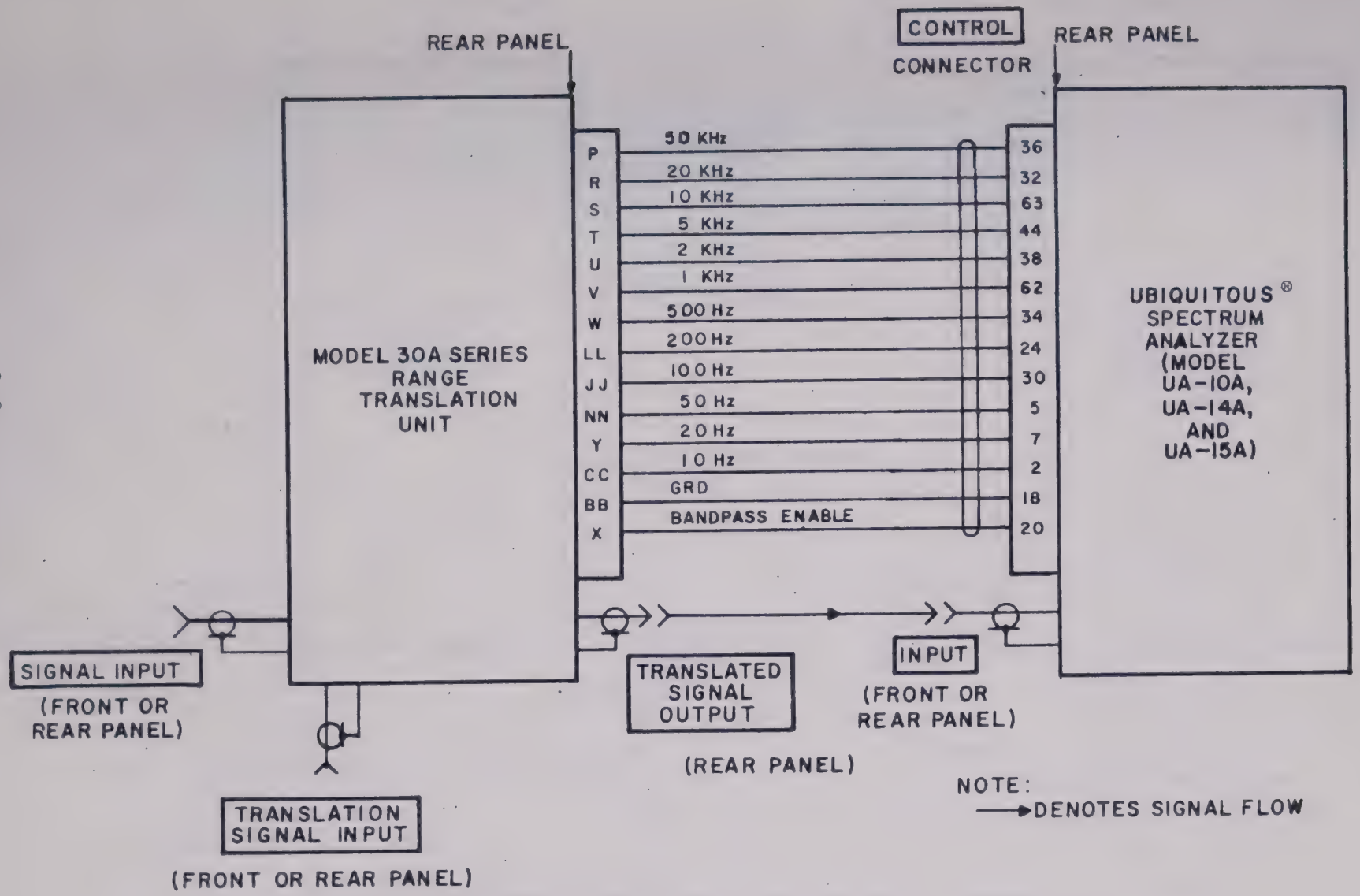


Figure 3-2. Interconnecting Diagram for the Model 30A Series of Translators with Models UA-10A, UA-14A, and UA-15A Series of Mini-Ubiq Analyzers

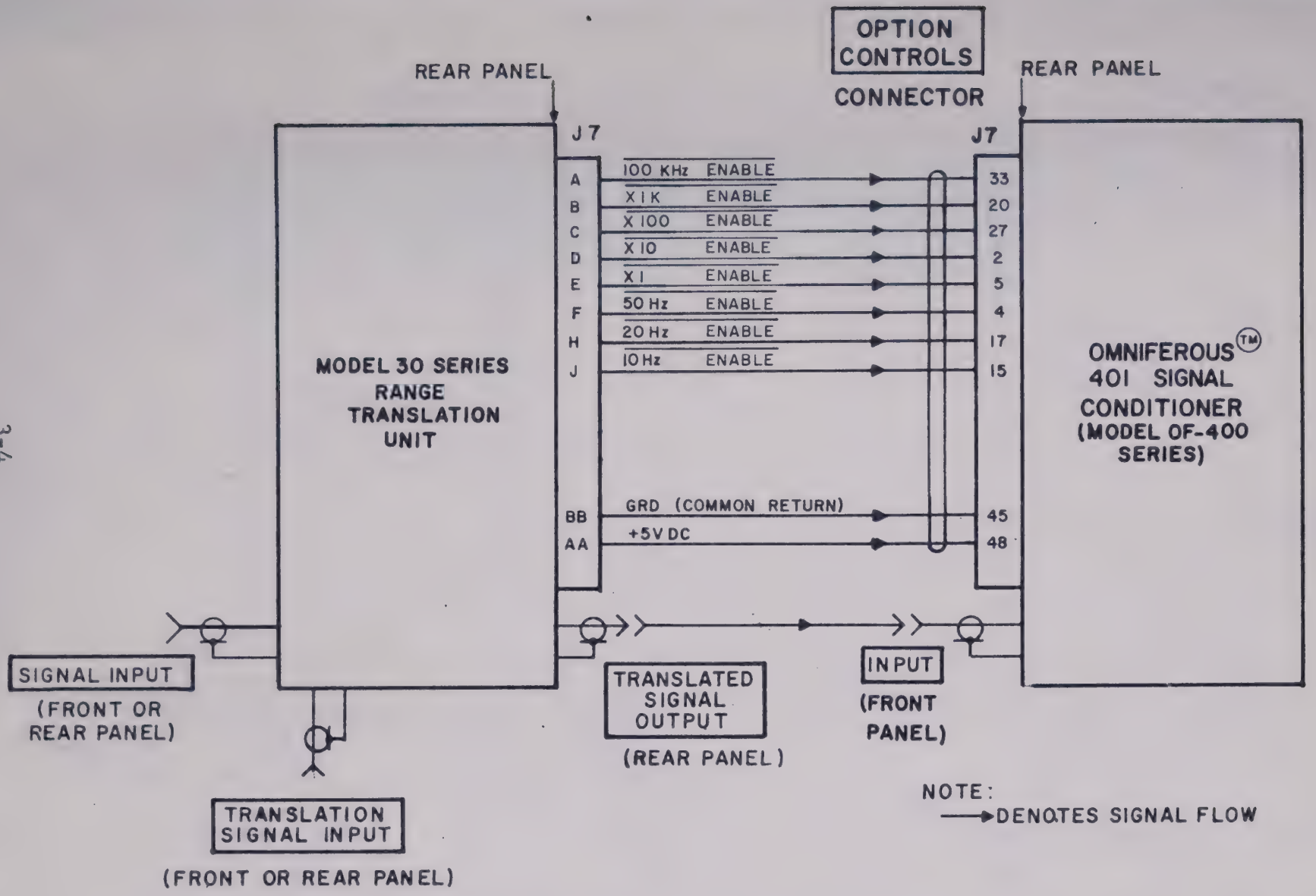


Figure 3-2B. Interconnecting Diagram for the Model 30 Series of Translators with the Model OF-400 Series of Analyzers

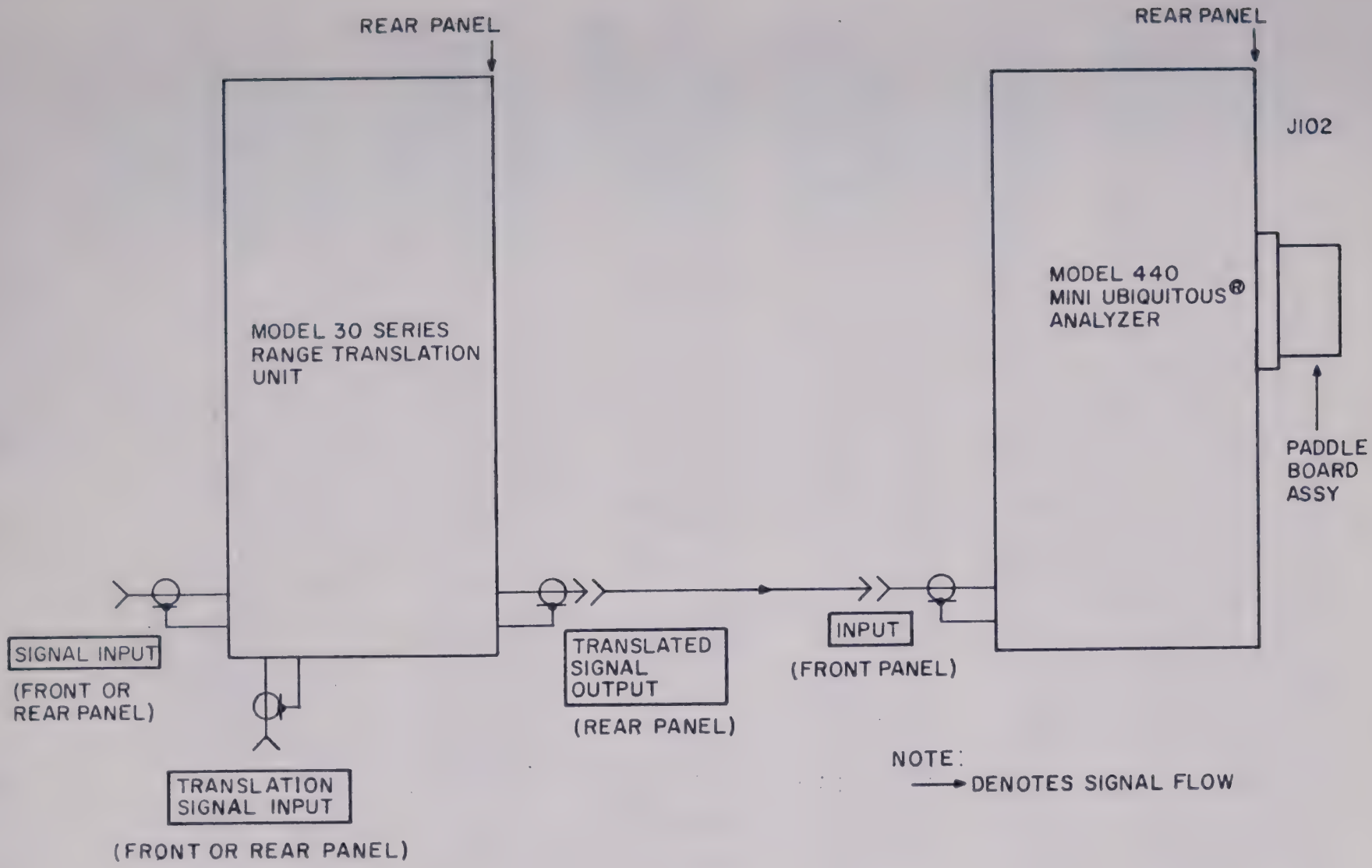


Figure 3-3. Interconnecting Diagram for the Model 30 Series of Translators with the Model 440 Series of Analyzers

e. Apply a signal from a high-stability signal source (such as the Option "/S", Option "/SS", General Radio Co. Frequency Synthesizer Type 1163-A, or equivalent) at a nominal level of 1 volt rms, to the TRANSLATION FREQUENCY INPUT jack. When the Option "/S", or Option "/SS", Synthesizer is employed, refer to Table 2-2 (on page 2-16) for proper settings of the Synthesizer's operating controls. The required frequency of the translation signal is determines as follows:

(1) For the 100 kHz translated frequency range (the first item listed in Table 1-3) the requirement is that the translation signal frequency must be equal to: the origin of the band to be translated plus 5.000 MHz.

(2) For those translated frequency ranges which are inscribed on the pushbuttons of the equipment in units of kHz (e.g., from 50 kHz down to 0.5 kHz, as listed in Group 1 of Table 1-3) the requirement is that the translation signal frequency must be equal to: the origin of the band to be translated plus 2.000 MHz.

(3) For those translated frequency ranges which are inscribed on the pushbuttons of the instrument in units of Hz (e.g., from 2000 Hz down to 10 Hz, as listed in Group 2 of Table 1-3) the requirement is that the translation signal frequency must be equal to: the origin of the band to be translated plus 100 kHz.

f. This subparagraph gives an example of the procedure for determining the required translation signal frequency. To perform a spectrum analysis of signals in the frequency range from 850 kHz to 860 kHz (in the 10 kHz ANALYSIS RANGE) the translation signal frequency should be set to 2.850 MHz. This signal setting is obtained by adding:

The desired origin frequency of	0.850 MHz
To	2.000 MHz
To yield a frequency of	2.850 MHz

g. After properly setting the required translation signal frequency, depress the front panel TRANSLATE pushbutton.

3-5. Certain controls on the associated Ubiquitous® Analyzer must now be set, as directed in the following steps:

a. When operating in the bandpass mode, set the SIGNAL ATTENUATION (COARSE INPUT AMPLITUDE on the Model 440 Analyzer) switch on the Analyzer's panel to the 20 dB position. If this switch is not set to 20 dB and full-scale signals are applied to the Translator, overloading of the Analyzer will result.

b. Set the ANALYSIS (or FREQUENCY) RANGE switch to one of the bandpass ranges (corresponding to that provided on the Translator) as desired for the particular spectrum analysis to be performed.

Note

The Analyzer will now examine a band (a "frequency window") which extends from the selected origin frequency to an upper limit frequency. The upper limit is determined by:

(1) The frequency (in Hz) designated by the selected setting of the ANALYSIS (or FREQUENCY) RANGE switch;
plus
(2) The selected origin frequency.

c. For the translation ranges listed in Group 1 of Table 1-3, apply a 0.1V rms pure tone signal (at a frequency which is within the Spectrum Analyzer's frequency window) to the SIGNAL INPUT jack on the Translator's panel.

d. For the translation ranges listed in Group 2 of Table 1-3, apply a 0.01V rms pure tone signal to the SIGNAL INPUT jack on the translator's panel.

e. Verify that the INPUT LEVEL meter (on the Analyzer's panel) indicates full scale (0 dB, equivalent to 100 percent of the Analyzer's dynamic range). The Model 440 Analyzer will indicate this condition by illuminating all the AMPLITUDE indicators except OVERLOAD.

f. Vary the frequency of the input signal over the limits of the "frequency window".

g. On the Spectrum Analyzer and the display device (such as oscilloscope or X-Y Recorder) verify that the "frequency window" corresponds to the lower and upper limits for that particular setting of the ANALYSIS (FREQUENCY) RANGE switch. (Refer to Table 1-3, in Section I of the manual, for these limits.)

h. Then increase the level of the input signal from the signal source to 0.3V rms. The OVERLOAD indicator (located on the translator's front panel) should illuminate; this indicates satisfactory equipment performance.

3-6. PRECAUTIONS REQUIRED TO PREVENT AN OVERLOAD.

3-7. When operating the Translator, exercise care to prevent signal overload of the Translator's and the Analyzer's input circuitry. Failure to observe this precaution may cause distortion of the Spectrum. For the operator's convenience, the OVERLOAD indicator lamp (mounted directly above the Translator's SIGNAL ATTENUATOR switch) will illuminate and produce a visual warning when an overload condition exists. To avoid overloads, proceed as directed in the following steps:

a. Initially, set the Analyzer's input attenuator to the 20 dB position. Then adjust the Translator's input attenuator to a position that causes the illuminated OVERLOAD indicator on the Spectrum Analyzer to be extinguished.

b. On the Translator, select the required TRANSLATION FREQUENCY RANGE pushbutton, for analysis of the desired frequency band.

c. On the Spectrum Analyzer, reset the SIGNAL ATTENUATION switch to produce a pointer deflection as close as possible to the zero dB mark on the INPUT LEVEL meter, or to produce a faint flicker on the Analyzer's OVERFLOW indicator lamp.

d. If the translated frequency range is shifted to another part of the frequency band under analysis, repeat the procedure outlined in step c., above. (A different setting of the Spectrum Analyzer's SIGNAL ATTENUATION switch may be required for each translated frequency range.)

e. The OVERLOAD indicator on the Translator is intended to indicate OVERLOAD of the Translator's input circuitry caused by broadband input signals. In normal operation, the OVERLOAD indicators on the Spectrum Analyzer is the true indication of non-linear operation which will result in spectral distortion.

3-8. APPLYING A DOWN-CONVERSION SIGNAL FROM AN EXTERNAL SIGNAL SOURCE.

3-9. To operate the Translator by using a down-conversion signal from an external signal source, proceed as follows:

a. Remove the top dust cover from the Translator, to gain access to the printed circuit board within the chassis. (A partial view of the printed circuit board is shown in Figure 3-3.)

b. Refer to Figure 3-3 to locate the subminiature coaxial cable which terminates in subminiature plug, P1, and its mating jack, J1. (This connection applies the output of the Translator's internal, down-converter, local-oscillator, generator circuit to the down-converter heterodyner.)

c. Disconnect the subminiature coaxial plug P1 from its mating jack J1; then shift the cable and plug P1 to jack J2 (shown in Figure 3-3). Jack J2 serves only as a convenient holder for the coaxial cable and plug, P1, when an external signal source is substituted for the built-in down-converter L.O. generator. (J2 is not connected to a circuit point.)

d. Apply a 1.0V rms output from the external down-converter local-oscillator generator to the coaxial jack mounted on the Translator's rear panel. This jack is designated DOWN CONVERTER LO INPUT.

e. To operate the Translator as a bandpass filter (i.e., for translation to the original frequency), connect a coaxial cable from the HETERODYNE FREQUENCY MONITOR jack to the DOWN CONVERTER L.O. INPUT jack. (Both jacks are mounted on the rear panel of the Translator.)

CAUTION

After completing the use of the external down-converter local-oscillator generator, be sure to remove its coaxial output cable from the Translator's DOWN CONVERTER L.O. INPUT jack. Then disconnect the subminiature coaxial plug P1 from its temporary holder (jack J2) on the Translator's printed circuit board. Reconnect plug P1 to the active jack J1 on the printed circuit board, as identified in Figure 3-3.

Figure 2. Life history of Mimulus.

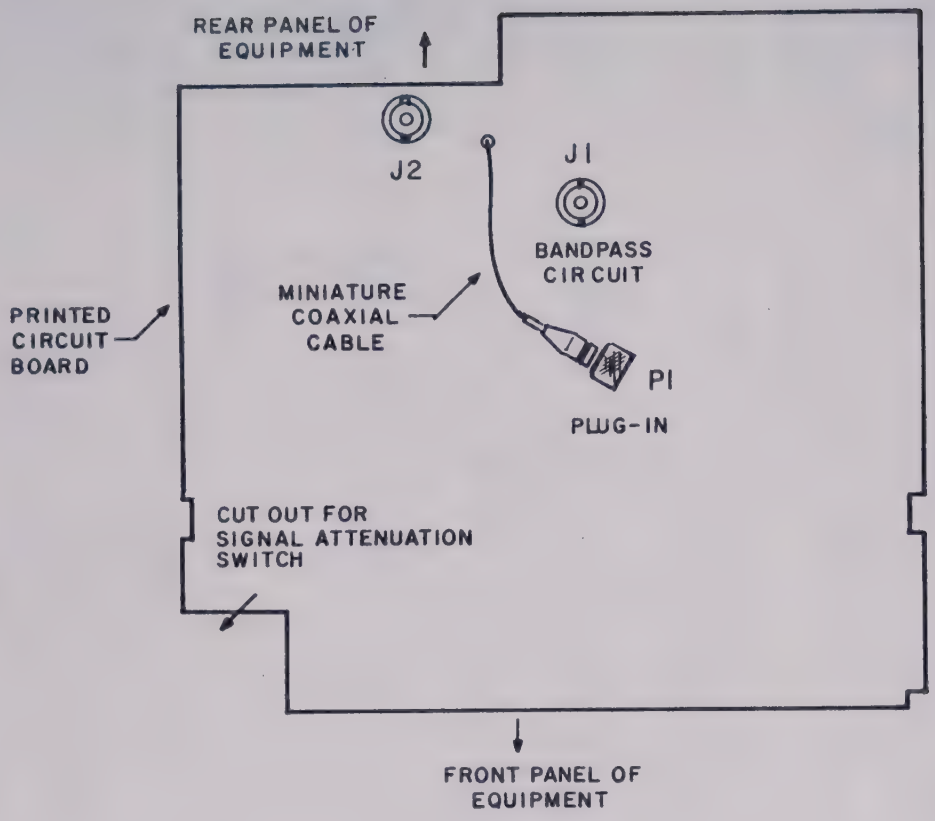


Figure 3-3. Top View of Printed Circuit Board, Identification of Plug P1, Jack J1 and Jack J2

Note: Reconnecting subminiature plug P1 and its coaxial cable to jack J1 is required so that the output of the internal down-converter local-oscillator generator has a path of continuity to the Translator's down-conversion heterodyner.

3-10. COMPENSATING FOR A TAPE-RECORDER'S FLUTTER AND WOW.

3-11. When the optional circuitry for compensation of a tape recorder's flutter and wow is provided in the Translator, proceed as directed in the following steps:

a. When recording the data, simultaneously record two pure tone signals on the other channels of the recorder. These tone signals (designated f_s and f_1) must be obtained from stable signal sources (better than 0.1% stability). Set the signal output level to 0.5V rms. Set the frequency of each tone signal as described below:

(1) For the f_s signal: Set the frequency to 3 times the Analysis Range which is employed.

(2) For the f_1 signal: Set the frequency to the origin of the band to be analyzed, minus 10% of the Analysis Range.

b. Apply the f_s signal to the EXTERNAL SAMPLING SIGNAL input jack (or pins) on the Spectrum Analyzer. Be sure to set the Spectrum Analyzer's EXTERNAL SAMPLING switch to EXTERNAL position.

NOTE

On the Model UA-6B Ubiquitous® Spectrum Analyzer, apply the f_s signal across pins A and B of the rear panel multipin CONTROL connector. On the Model UA-10 series of Mini-Ubiq Spectrum Analyzers, apply this f_s signal to the rear panel coaxial jack which is designated EXTERNAL SAMPLING SIGNAL.

c. On the Translator, remove the top dust cover to gain access to the printed circuit board. Disconnect the coaxial cable and plug from subminiature jack J3 and connect this plug to subminiature jack J4, on the Single Sideband Modulator Section of the printed circuit board.

d. Interconnect the rear panel DOWN CONVERTER L.O. INPUT jack to the EXTERNAL CARRIER INPUT jack.

e. Apply the f_1 signal to the front or rear panel TRANSLATION FREQUENCY INPUT jack.

f. Proceed to analyze the signal.

NOTE

Whenever the analysis range or the origin frequency is changed, a new set of tone signal frequencies (f_s and f_1) must be recorded. Refer to paragraph a, above for determining the required new frequencies.